

WHAT IS CLAIMED IS:

1. A system for monitoring wear of an aircraft part, comprising:
at least one sensor for sensing a parameter of usage of an aircraft
part and for generating a signal indicating a sensed value of said parameter of
usage of said aircraft part; and

5 means for determining an estimate of usage of said part based
upon said signal indicating said sensed value of said parameter of usage of said
aircraft part.

2. The system for monitoring wear of an aircraft part of Claim
1, wherein said aircraft part is a brake, and said at least one sensor for sensing
a parameter of usage of an aircraft part and for generating a signal indicating
a sensed value of said parameter of usage of said aircraft part comprises:

5 a linear brake wear indicator attached to the brake, wherein each
time the brake is actuated, the linear brake wear indicator moves a discrete
distance; and

a linear position encoder for measuring and generating a linear
position signal indicating the distance travelled by the linear brake wear
10 indicator as an indication of brake usage, and wherein said means for
determining an estimate of usage determines an estimate of usage of said brake
based upon said linear position signal.

3. The system for monitoring wear of an aircraft part of Claim
2, wherein said linear brake wear indicator includes a plurality of longitudinally
arranged markings, and said linear position encoder comprises an optical
encoder for counting said markings passing by said optical encoder for
5 determining the distance travelled by the linear brake wear indicator upon

brake actuation, for indicating the distance travelled by the linear brake wear indicator as an indication of brake usage.

4. The system for monitoring wear of an aircraft part of Claim 2, wherein said linear brake wear indicator comprises a brake wear pin.

5 5. The system for monitoring wear of an aircraft part of Claim 2, wherein said linear brake wear indicator includes a plurality of longitudinally arranged digitized markings indicating longitudinal position on said linear brake wear indicator, and said linear position encoder comprises an optical encoder for encoding the digitized markings, for indicating the distance travelled by the linear brake wear indicator as an indication of brake usage.

6. The system for monitoring wear of an aircraft part of Claim 2, further comprising a wheel speed monitor for generating a wheel speed signal indicating wheel speed of the aircraft, and said means for determining an estimate of usage receives said wheel speed signal for distinguishing between static brake applications and moving brake applications based upon said wheel speed signal.

7. The system for monitoring wear of an aircraft part of Claim 6, wherein said wheel speed monitor comprises a wheel speed sensor.

8. The system for monitoring wear of an aircraft part of Claim 6, wherein said wheel speed monitor comprises an aircraft speed sensor.

9. The system for monitoring wear of an aircraft part of Claim 6, wherein said means for determining an estimate of usage further comprises

means for measuring the period of time elapsed during each brake application, and means for determining the distance over which each brake application occurs, based upon the wheel speed during each brake application and said period of time elapsed during each brake application, for determining the degree to which each individual brake application contributes to brake wear.

10. The system for monitoring wear of an aircraft part of Claim 2, further comprising means for sensing brake temperature, and for generating a temperature signal indicating brake temperature that is received by said means for determining an estimate of usage, and wherein said estimate of usage is based upon said temperature signal.

11. The system for monitoring wear of an aircraft part of Claim 10, wherein said means for determining an estimate of usage further comprises means for estimating the degree to which each individual brake application contributes to wear based upon said temperature signal.

12. The system for monitoring wear of an aircraft part of Claim 1, wherein said aircraft part is a tire, and said at least one sensor for sensing a parameter of usage of an aircraft part and for generating a signal indicating a sensed value of said parameter of usage of said aircraft part comprises:

a wheel speed monitor for generating a wheel speed signal indicating wheel speed of the aircraft, and said means for determining an estimate of usage receives said wheel speed signal for distinguishing between static brake applications and moving brake applications based upon said wheel speed signal; and

means for sensing aircraft yaw, and for generating a yaw signal indicating aircraft yaw received by said means for determining an estimate of

usage, and wherein said means for determining an estimate of usage estimates tire wear based upon said wheel speed signal and said yaw signal.

13. The system for monitoring wear of an aircraft part of Claim 12, wherein said wheel speed monitor comprises a wheel speed sensor.

14. The system for monitoring wear of an aircraft part of Claim 12, wherein said wheel speed monitor comprises an aircraft speed sensor.

15. The system for monitoring wear of an aircraft part of Claim 1, wherein said aircraft part is a standby system, and said at least one sensor for sensing a parameter of usage of an aircraft part and for generating a signal indicating a sensed value of said parameter of usage of said aircraft part comprises:

means for sensing input power to said standby system and for generating an input power signal received by said means for means for determining an estimate of usage; and

means for measuring the period of time elapsed during each usage of said standby system and for generating an elapsed time signal received by said means for means for determining an estimate of usage, and wherein said means for determining an estimate of usage determines usage of said standby system based upon said input power signal and said elapsed time signal.

16. The system for monitoring wear of an aircraft part of Claim 1, wherein said aircraft part is a landing gear, and said at least one sensor for sensing a parameter of usage of an aircraft part and for generating a signal indicating a sensed value of said parameter of usage of said aircraft part

5 comprises:

means for sensing load on said landing gear and for generating a load signal received by said means for means for determining an estimate of usage; and

10 means for measuring the period of time elapsed during each usage of said landing gear and for generating an elapsed time signal received by said means for means for determining an estimate of usage, and wherein said means for determining an estimate of usage determines usage of said landing gear based upon said load signal and said elapsed time signal.

17. The system for monitoring wear of an aircraft part of Claim 1, further comprising means for storing said estimate of usage of said part for access of said estimate by ground personnel.

18. The system for monitoring wear of an aircraft part of Claim 1, wherein said at least one sensor for sensing a parameter comprises a plurality of sensors for sensing usage of a plurality of parts of the aircraft, and said means for determining an estimate of usage comprises a central computer.

19. A system for monitoring wear of an aircraft brake, comprising:

5 at least one linear brake wear indicator attached to the brake, wherein each time the brake is actuated, the linear brake wear indicator moves a discrete distance;

a linear position encoder for measuring and generating a linear position signal indicating the distance travelled by the linear brake wear indicator as an indication of brake usage, and wherein said means for determining an estimate of usage determines an estimate of usage of said brake

10 based upon said linear position signal; and
means for determining an estimate of usage of said part based
upon said signal indicating said sensed value of said parameter of usage of said
aircraft part.

20. The system for monitoring wear of an aircraft brake of Claim
19, wherein said linear brake wear indicator includes a plurality of
longitudinally arranged markings, and said linear position encoder comprises
an optical encoder for counting said markings passing by said optical encoder
5 for determining the distance travelled by the linear brake wear indicator upon
brake actuation, for indicating the distance travelled by the linear brake wear
indicator as an indication of brake usage.

21. The system for monitoring wear of an aircraft brake of Claim
19, wherein said linear brake wear indicator comprises a brake wear pin.

22. The system for monitoring wear of an aircraft brake of Claim
19, wherein said linear brake wear indicator includes a plurality of
longitudinally arranged digitized markings indicating longitudinal position on
said linear brake wear indicator, and said linear position encoder comprises an
5 optical encoder for encoding the digitized markings, for indicating the distance
travelled by the linear brake wear indicator as an indication of brake usage.

23. The system for monitoring wear of an aircraft brake of Claim
19, further comprising a wheel speed monitor for generating a wheel speed
signal indicating wheel speed of the aircraft, and said means for determining
an estimate of usage receives said wheel speed signal for distinguishing
5 between static brake applications and moving brake applications based upon

said wheel speed signal.

24. The system for monitoring wear of an aircraft brake of Claim 23, wherein said wheel speed monitor comprises a wheel speed sensor.

25. The system for monitoring wear of an aircraft brake of Claim 23, wherein said wheel speed monitor comprises an aircraft speed sensor.

26. The system for monitoring wear of an aircraft brake of Claim 23, wherein said means for determining an estimate of usage further comprises means for measuring the period of time elapsed during each brake application, and means for determining the distance over which each brake application occurs, based upon the wheel speed during each brake application and said period of time elapsed during each brake application, for determining the degree to which each individual brake application contributes to brake wear.

27. The system for monitoring wear of an aircraft brake of Claim 19, further comprising means for sensing brake temperature, and for generating a temperature signal indicating brake temperature that is received by said means for determining an estimate of usage, and wherein said estimate of usage is based upon said temperature signal.

28. The system for monitoring wear of an aircraft brake of Claim 27, wherein said means for determining an estimate of usage further comprises means for estimating the degree to which each individual brake application contributes to wear based upon said temperature signal.

29. A method for monitoring wear of at least one aircraft part, comprising:

sensing at least one parameter of usage of at least one aircraft part and generating a signal indicating a sensed value of said at least one parameter of usage of said at least one aircraft part; and

determining an estimate of usage of said at least one aircraft part based upon said signal indicating said sensed value of said at least one parameter of usage of said at least one aircraft part.

30. The method for monitoring wear of at least one aircraft part of Claim 29, wherein said at least one aircraft part is a brake, and said step of sensing a parameter of usage of at least one aircraft part and generating a signal indicating a sensed value of said at least one parameter of usage of said at least one aircraft part comprises:

providing a linear brake wear indicator attached to the brake, wherein each time the brake is actuated, the linear brake wear indicator moves a discrete distance; and

measuring the linear position of said linear brake wear indicator and generating a linear position signal indicating the distance travelled by the linear brake wear indicator as an indication of brake usage, and wherein said step of determining an estimate of usage comprises determining an estimate of usage of said brake based upon said linear position signal.

31. The method for monitoring wear of at least one aircraft part of Claim 30, wherein said linear brake wear indicator includes a plurality of longitudinally arranged markings, and said steps of measuring the linear position of said linear brake wear indicator and generating a linear position signal comprise providing an optical encoder for counting said markings

passing by said optical encoder for determining the distance travelled by the linear brake wear indicator upon brake actuation, for indicating the distance travelled by the linear brake wear indicator as an indication of brake usage.

32. The method for monitoring wear of at least one aircraft part of Claim 30, wherein said linear brake wear indicator includes a plurality of longitudinally arranged digitized markings indicating longitudinal position on said linear brake wear indicator, and said steps of measuring the linear position
5 of said linear brake wear indicator and generating a linear position signal comprise providing an optical encoder for encoding the digitized markings, for indicating the distance travelled by the linear brake wear indicator as an indication of brake usage.

33. The method for monitoring wear of at least one aircraft part of Claim 30, further comprising the step of generating a wheel speed signal indicating wheel speed of the aircraft, and said step of determining an estimate of usage comprises distinguishing between static brake applications and
5 moving brake applications based upon said wheel speed signal.

34. The method for monitoring wear of at least one aircraft part of Claim 33, wherein said step of generating a wheel speed signal comprises providing a wheel speed sensor for indicating wheel speed of the aircraft.

35. The method for monitoring wear of at least one aircraft part of Claim 33, wherein said step of generating a wheel speed signal comprises determining wheel speed based upon speed of the aircraft speed.

36. The method for monitoring wear of at least one aircraft part

of Claim 33, wherein said step of determining an estimate of usage further comprises measuring the period of time elapsed during each brake application, and determining the distance over which each brake application occurs, based upon the wheel speed during each brake application and said period of time elapsed during each brake application, to determine the degree to which each individual brake application contributes to brake wear.

37. The method for monitoring wear of at least one aircraft part of Claim 30, further comprising means for sensing brake temperature, and for generating a temperature signal indicating brake temperature that is received by said means for determining an estimate of usage, and wherein said estimate of usage is based upon said temperature signal.

38. The method for monitoring wear of at least one aircraft part of Claim 37, wherein said step of determining an estimate of usage further comprises estimating the degree to which each individual brake application contributes to wear based upon said temperature signal.

39. The method for monitoring wear of at least one aircraft part of Claim 29, wherein said at least one aircraft part is a tire, and said step of sensing a parameter of usage of at least one aircraft part and generating a signal indicating a sensed value of said at least one parameter of usage of said at least one aircraft part comprises:

generating a wheel speed signal indicating wheel speed of the aircraft, and said step of determining an estimate of usage comprises distinguishing between static brake applications and moving brake applications based upon said wheel speed signal; and

sensing aircraft yaw, and generating a yaw signal indicating

aircraft yaw received by said means for determining an estimate of usage, and wherein said step of determining an estimate of usage is based upon said wheel speed signal and said yaw signal.

40. The method for monitoring wear of at least one aircraft part of Claim 29, wherein said at least one aircraft part is a standby system, and said step of sensing at least one parameter of usage of at least one aircraft part and generating a signal indicating a sensed value of said at least one parameter of usage of said at least one aircraft part comprises:

sensing input power to said standby system and generating an input power signal; and

measuring the period of time elapsed during each usage of said standby system and generating an elapsed time signal, and wherein said step of determining an estimate of usage is based upon said input power signal and said elapsed time signal.

41. The method for monitoring wear of at least one aircraft part of Claim 29, wherein said at least one aircraft part is a landing gear, and said step of sensing at least one parameter of usage of at least one aircraft part and generating a signal indicating a sensed value of said at least one parameter of usage of said at least one aircraft part comprises:

sensing load on said landing gear and generating a load signal; and

measuring the period of time elapsed during each usage of said landing gear and generating an elapsed time signal, and wherein said step of determining an estimate of usage is based upon said load signal and said elapsed time signal.

42. The method for monitoring wear of at least one aircraft part of Claim 29, further comprising the step of storing said estimate of usage of said at least one aircraft part for access of said estimate by ground personnel.

43. The method for monitoring wear of at least one aircraft part of Claim 29, wherein said step of sensing at least one parameter of usage of at least one aircraft part and generating a signal indicating a sensed value of said at least one parameter of usage of said at least one aircraft part comprises
5 sensing a plurality of parameters for a plurality of aircraft parts and generating a plurality of signals indicating a plurality of sensed values of said plurality of parameters of usage of said plurality of aircraft parts, and said step of determining an estimate of usage of said at least one aircraft part based upon said signal indicating said sensed value of said at least one parameter of usage
10 of said at least one aircraft part comprises determining a plurality of estimates of usage of said plurality of aircraft parts based upon said plurality of signals.